NCSX (H. Neilson)
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The Laboratory awarded a subcontract to Major Tool and Machine, Inc., of Indianapolis, IN, to manufacture the NCSX vacuum vessel. The 25,000-pound toroidal vessel resembles a twisted doughnut in shape. It will be made of Inconel 625, an alloy with high strength, high electrical resistivity, and low magnetic permeability, properties which are important for NCSX performance. It will be manufactured in three identical segments, which will be joined together by PPPL during final assembly of the NCSX to form a closed chamber. Each segment will be fabricated from several 3/8-inch thick panels which will be press formed and then welded together to form the complete segment. The contract also includes fabrication of the ninety ports that will provide plasma heating and diagnostic access on the completed device. Major Tool, under a previous NCSX contract, developed the manufacturing process that they will use and demonstrated their capability by fabricating a full-scale prototype sector of the vessel that met all requirements. They were selected for the production program through a competitive procurement process.

The project is preparing to wind the twisted racetrack demonstration coil, a sub-scale article that is prototypical of the NCSX modular coils with respect to its coil winding challenges. The twisted racetrack winding form underwent pre-process machining at PPPL and has been mounted in the fixture which will allow it to be maneuvered into different positions during the winding process. The coil clamps have been fabricated in an outside machine shop and delivered to PPPL. The autoclave, a vacuum oven which will be used for epoxy impregnation of the coil, is undergoing its pre-operational test procedures, which include high-temperature, vacuum, and pressure tests. It is expected to be fully operational by the end of the month.

Initial electromagnetic analyses of inductive vacuum vessel heating have been completed by Long Poe Ku. The results indicate that vacuum vessel baking to 150C using inductive heating at 60Hz appears feasible. Uniformity of heating can be controlled by the choice of which poloidal field coils are used as the primary. Resistive heaters on the port extensions are planned and will be used to supplement the inductive heating in the vacuum vessel shell.

David Mikkelsen participated in a workshop on stellarator kinetic theory in Graz, Austria. International development of modules for a stellarator transport analysis code was discussed. Participants from Austria, Ukraine, and Spain expressed interest in joining the current collaborators, which include Germany's Max Planck Institute for Plasma Physics and several institutions in the US.